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10/596,750	05/15/2007	Van Suong Hoa	789-100	1088

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EXAMINER
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FEELY, MICHAEL J

ART UNIT	PAPER NUMBER
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1761

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09/14/2011

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/596,750	<b>Applicant(s)</b> HOA ET AL.	
	<b>Examiner</b> MICHAEL J. FEELY	<b>Art Unit</b> 1761	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2011.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 5) ☒ Claim(s) 1,3-13,20-24 and 26-32 is/are pending in the application.
- 5a) Of the above claim(s) 28-32 is/are withdrawn from consideration.
- 6) ☒ Claim(s) 1,3-13 and 27 is/are allowed.
- 7) ☒ Claim(s) 20,21,23 and 24 is/are rejected.
- 8) ☒ Claim(s) 22 and 26 is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 22 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Pending Claims***

Claims 1, 3-13, 20-24, and 26-32 are pending.

### ***Priority***

1. The instant application is a national stage entry of PCT/CA04/02184, filed December 22, 2004, which claims priority to US provisional application no. 60/531,618, filed December 23, 2003.

- Claims 1, 3-16, 18-24, 26, and 27 are fully supported by the provisional application; accordingly, they have an effective filing date of December 23, 2003.

### ***Election/Restrictions***

2. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

- Group I, claim(s) 1, 3-13, 20-24, 26, and 27, drawn to: 1) a modified epoxy comprising a mixture of a clay solution (clay + solvent) and a pristine epoxy; 2) and a method of making said modified epoxy.
- Group II, claim(s) 28-32, drawn to a composite epoxy comprising clay agglomerates and a pristine epoxy.

Art Unit: 1761

3. The groups of inventions listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

- The originally filed claims (apparatus, method, and composition) all related to a modified epoxy composition comprising a mixture of a clay solution (nano-clay + solvent) and pristine epoxy. The scope of new claims 28-32 does not require a solvent or a clay solution. Accordingly, they lack the same special technical feature of the remaining claims 1, 3-13, 20-24, 26, and 27 (method and composition) associated with the original embodiment.

4. Newly submitted claims 28-32 (Group II) are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: they lack unity for the reasons set forth above in section 3.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 28-32 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### ***Response to Arguments***

5. Applicant's arguments filed June 14, 2011 have been fully considered but they are not fully persuasive.

6. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., increase in

Art Unit: 1761

fracture toughness and fracture strain) are not recited in rejected claims 20, 21, 23, and 24.

Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

The increase in fracture toughness and fracture strain are present in dependent claims 22 and 26. For these claims, Applicant's arguments are persuasive (see pages 6-10 of the response). Accordingly, the following rejections have been withdrawn:

- The rejection of claim 22 under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chen et al. (XP008051803).
- The rejection of claim 26 under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (XP008051803) in view of Furihata (US Pat. No. 4,465,542).

### ***Claim Rejections - 35 USC § 102/103***

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 20, 21, and 24 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chen et al. (XP008051803).

Regarding claims 20, 21, and 24, Chen et al. disclose: **(20)** a modified epoxy produced from a pristine epoxy (Abstract) comprising: solvent (page 364: "2.1.Materials"; "2.3.Processing: *Solvent-assisted method*"), nano-clay particles (page 364: "2.1.Materials"; "2.3.Processing: *Solvent-assisted method*"), and pristine epoxy (page 364: "2.1.Materials"; "2.3.Processing: *Solvent-assisted method*"), wherein clay particles of nano-dimensions are finely

Art Unit: 1761

and homogeneously distributed in the modified epoxy (page 364: “2.1.Materials”; “2.3.Processing: *Solvent-assisted method*”); the modified epoxy having at least higher barrier properties and thermal resistance than the pristine epoxy (page 373: Tables IV; page 374: Figure 6); and

(21) comprising finely dispersed clay agglomerates of less than about 1  $\mu\text{m}$  and agglomerates of a maximum diameter between about 1  $\mu\text{m}$  and 2  $\mu\text{m}$  (Abstract; pages 362-363: “Introduction”; page 364: “2.1.Materials”; “2.3.Processing: *Solvent-assisted method*”; pages 365-368: “3.2. Epoxy-Silicate Nanocomposites”); and (24) further comprising additives (page 364: “2.1.Materials”; “2.3.Processing: *Solvent-assisted method*” – see *modified clay, curing agent*).

Chen et al. form their dispersion by: (a) creating a solution of solvent, nano-clay, and epoxy resin; and (b) mechanically stirring and sonicating the solution (page 364: “2.3. Processing: *Solvent-assisted method*”). Accordingly, Chen et al. fail to disclose the claimed steps of:

(a) mixing solvents and clay particles of a dimension in the nanometer range to form a clay solution, agglomerates of clay particles forming in the clay solution;

(b) submitting a flow of the clay solution to: (1) high pressure; (2) a high velocity and breaking impacts in a region of obstacles to allow the agglomerates to be broken down; and (3) a sudden lower pressure; and

(c) mixing the dispersed clay solution with at least part of the pristine epoxy.

However, it should be noted that the instant claims are provided in product-by-process format. In light of this, it has been found that, “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product

Art Unit: 1761

itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process,” – *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (*see MPEP 2113*).

Therefore, it appears that the instantly claimed modified epoxy is the same or an obvious variation of the one set forth in Chen et al. because the final product of Chen et al. satisfies all of the material/chemical limitations of the instant invention.

### ***Claim Rejections - 35 USC § 103***

9. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (XP008051803) in view of Furihata (US Pat. No. 4,465,542).

Regarding claim 23, the teachings of Chen et al. are as set forth above and incorporated herein. Chen et al. desire toughness and flexibility in their composition; however, they fail to explicitly disclose: (23) wherein said pristine epoxy is a rubber-modified epoxy.

The teachings of Furihata demonstrate that rubber materials, such as CTBN, are recognized in the art as suitable additives (*modifiers*) for epoxy/clay compositions that require toughness and flexibility (*see Abstract; column 6, lines 37-53*). In light of this, it has been found that the selection of a known material based on its suitability for its intended use supports a *prima facie* obviousness determination – *see MPEP 2144.07*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to add rubber to the composition of Chen et al. because the teachings of Furihata

Art Unit: 1761

demonstrate that rubber materials are recognized in the art as suitable additives (*modifiers*) for epoxy/clay compositions that require toughness and flexibility.

***Allowable Subject Matter***

10. Claims 1, 3-13, and 27 are allowed.
11. Claims 22 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Suggested Claim Language***

12. The following is suggested claims language for claims 20-24 and 26:

20. (Proposed Amendment) A modified epoxy produced from a pristine epoxy, the modified epoxy having at least higher barrier properties, higher thermal resistance, a higher critical stress intensity factor ( $K_{IC}$ ), and a higher critical strain energy release rate ( $G_{IC}$ ) than the pristine epoxy, the modified epoxy produced by:

a) mixing solvents and clay particles of a dimension in the nanometer range, to form a clay solution comprising clay particles of a dimension in the nanometer range and agglomerates of clay particles;

b) generating a flow of clay solution and submitting said flow to: (1) high pressure; (2) high velocity and breaking impacts in a region of obstacles to allow the agglomerates to be broken down; and (3) a sudden lower pressure, yielding a dispersed clay solution having a fine



Art Unit: 1761

and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution; and

c) mixing the dispersed clay solution with at least part of the pristine epoxy, wherein a rubber material is optionally provided with the pristine epoxy during mixing; and

wherein a content of about 1 wt% of clay loading and no optional rubber yields an increase in  $K_{IC}$  and  $G_{IC}$  of up to 2 and 3 times respectively, with respect to the pristine epoxy.

21. (Original)

22. (Proposed Cancellation)

23. (Proposed Amendment) The modified epoxy according to claim 21, wherein the optional rubber is provided with the pristine epoxy during mixing.

24. (Original)

26. (Proposed Amendment). The modified epoxy according to claim 23, wherein the optional rubber is CTBN, and a content of 6 phr of clay loading and 20 phr of CTBN yields an increase in  $K_{IC}$  and  $G_{IC}$  of up to 2.2 and 7.6 times respectively, with respect to the pristine epoxy.

Furthermore, for the sake of consistency, Applicant may consider making similar changes to claims 1, 10, 13, and 27:

1. (Proposed Amendment) A method for making a modified epoxy, comprising the steps of:

Art Unit: 1761

a) mixing solvents and clay particles of a dimension in the nanometer range, to form a clay solution comprising clay particles of a dimension in the nanometer range and agglomerates of clay particles;

b) generating a flow of a clay solution and submitting said flow to: (1) high pressure to generate high velocity and to allow shearing in the clay solution to occur; (2) a region of obstacles allowing the agglomerates of clay particles to be broken down; and (3) a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution; and

c) mixing the dispersed clay solution with at least a pristine epoxy, wherein a rubber material is optionally provided with the pristine epoxy during mixing.

10. (Proposed Amendment) The method according to claim 9, wherein a content of about 1 wt% of clay loading and no optional rubber yields an increase in critical stress intensity factor ( $K_{IC}$ ) and critical strain energy release rate ( $G_{IC}$ ) of up to 2 and 3 times respectively, with respect to the pristine epoxy.

13. (Proposed Amendment) The method according to claim 1, wherein the optional rubber is provided with the pristine epoxy during mixing.

27. (Proposed Amendment) The method according to claim 13, wherein the optional rubber is CTBN, and a content of 6 phr of clay loading and 20 phr of CTBN yields an increase in critical stress intensity factor ( $K_{IC}$ ) and critical strain energy release rate ( $G_{IC}$ ) of up to 2.2 and 7.6 times respectively, with respect to the pristine epoxy.

Art Unit: 1761

***Conclusion***

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Art Unit: 1761

*Communication*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL J. FEELY whose telephone number is (571)272-1086. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Y. Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MICHAEL J FEELY/  
Primary Examiner, Art Unit 1761

September 11, 2011